F-3992

PROJECT SPECIFIC PLAN FOR WASTE PITS REMEDIAL ACTION PROJECT INVESTIGATION OF WASTE PIT LINERS AND LINER SUBSURFACE MATERIAL

WASTE PITS REMEDIAL ACTION PROJECT

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

FOR INFORMATION ONLY

NOVEMBER 28, 2001

U.S. DEPARTMENT OF ENERGY
FERNALD AREA OFFICE

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FERNALD ENVIRONMENTAL MONITORING PROJECT

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ASL	analytical support level
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	constituents of concern
DQO	Data Quality Objective
EPDM	Ethylene Propylene Diene Monomer
FACTS	Fernald Analytical Computerized Tracking System
FEMP	Fernald Environmental Management Project
GMA	Great Miami Aquifer
IT	International Technology Corporation
mL	milliliter
OU1	Operable Unit 1
PSP	Project Specific Plan
QA/QC	Quality Assurance/Quality Control
RI/FS	remedial investigation/feasibility study
RWP	Radiological Work Permit
SCQ	Sitewide CERCLA Quality Assurance Project Plan
SED	Sitewide Environmental Database
SEP	Sitewide Excavation Plan
SVOC	semi-volatile organic compound
TAL	Target Analyte List
V/FCN	Variance/Field Change Notice
VOC	volatile organic compound
WPRAP	Waste Pit Remedial Action Project

1.0 INTRODUCTION

1.1 PURPOSE

This project specific plan (PSP) has been developed to investigate the possible presence of contamination in the clay liner material and the material below the liners of the various pits in the Fernald Environmental Management Project (FEMP) Waste Storage Area (i.e., waste pits). Various portions of the waste pit floors will be investigated as excavation continues over the history of the Waste Pits Remedial Action Project (WPRAP). The following objectives will drive the work performed under this PSP:

- determine if radiological and/or chemical contaminants have migrated into clay liner material and material beneath the liners of the waste pits
- if present, measure the level of contaminants in the liner and liner subsurface material at various depths below the pit floor surface
- determine the thickness and general composition of pit liner material as well as the lithology of the material underlying the liners.

This activity will be conducted in multiple phases as excavation of the waste pits progresses. The information from this investigation effort will be used to facilitate the remediation of the material underlying the waste pits.

1.2 BACKGROUND

The Waste Pit Area of the FEMP covers approximately 38 acres and is located west of the Former Production Area (Figure 1-1). Designated as Operable Unit 1 (OU1) during the Remedial Investigation/Feasibility Study (RI/FS), this area consists of Waste Pits 1 through 6, the Burn Pit, and the Clearwell. The various components of OU1 were constructed from 1952 (Waste Pit 1) through 1979 (Waste Pit 6) and were used to store waste products generated by the FEMP uranium refinement process. The waste product sources were numerous production byproducts from chemical feed material extraction and precipitation, filtering and settling operations, drying operations, chemical conversion, and heat treatment. The waste pits were also used to dispose of other wastes generated in the refinement process and site support activities, including pollution control products, flyash from the boiler plant, residues from the process water treatment plant, construction debris, and discarded equipment, vessels, and containers. These wastes were contaminated with numerous radiological and chemical constituents, including uranium isotopes and their decay products, thorium isotopes and their decay products, fission products such as technetium-99 (Tc-99), potentially hazardous metals (such as arsenic, chromium, nickel, and lead) extracted as impurities from the uranium-bearing feedstock, and organic chemical constituents used in various plant processes and maintenance operations. Characterization of the physical, chemical, and radiological profiles of the contents of each waste pit, supplemented by treatability studies, were completed in 1992 to meet the objectives of the OU1 RI/FS. No analytical information on the nature and extent of contaminants in the soils beneath the waste pits is available. Because of the concern about maintaining the integrity of the waste pit liners to prevent environmental migration of pit contaminants into the underlying Great Miami Aquifer, waste pit content characterization borings were carefully conducted so as not to breach the pit lining material. The informational needs of the RI were satisfied through the use of computer modeling that simulated the migration of contaminants from the waste pits to the underlying soils.

Lining material used in the waste pits includes native clay (either from an existing in-situ clay lens, or dug from the Burn Pit) used for Pits 1, 2, 3, 4, and the Clearwell. A 60-mil thick Ethylene Propylene Diene Monomer (EPDM) elastomeric membrane underlain with native soil was used for Pits 5 and 6, and native soil is beneath the Burn Pit (which was created following removal of clay for lining other pits).

1.3 CONSTITUENTS OF CONCERN

The Sitewide Excavation Plan (SEP) for the FEMP has organized work for final remediation of the site into ten remediation areas and includes a preliminary identification of primary, secondary, and ecological constituents of concern (COC) for each of the remediation areas (SEP, Table 2-7). Remediation Area 6 includes the waste pits and vicinity, following removal of the waste pit material. Thirty-eight COCs are listed for Remediation Area 6, based on existing sampling data and process history. The Remediation Area 6 COCs include VOC, SVOC/PAH, inorganic, pesticide/PCB, dioxins, and herbicide constituents. Because the material to be sampled under this PSP has never been analyzed, the list of analytical COCs will be expanded from the specific constituents listed in the SEP to include the entire standard list of constituents within each of these analytical categories. This list may be modified for later borings after evaluation of analytical data from the initial borings.

1.4 SCOPE

Under the initial phase of this PSP, physical samples will be collected from those portions of Pits 1 and 3 where excavation has progressed to the liner (Figure 1-2), to meet the objectives stated in Section 1.1. The analytical results of this investigation will be compiled to allow evaluation of the level of contamination migration into the liner material and/or the underlying material and to provide data for later dispositioning of waste pit liner/subliner material. The list of analytical constituents may be revised for later phases of liner and subsurface material investigation based on data collected from earlier phases. Later additional boring and sampling activities, as further pit floor surface is exposed through excavation, will be identified by a Variance/Field Change Notice (V/FCN) to this PSP. All sampling activities carried out under this PSP will be performed in accordance with the Sitewide Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Quality Assurance Project Plan (SCQ), and Data Quality Objective (DQO) SL-061, Revision 1 (Appendix B).

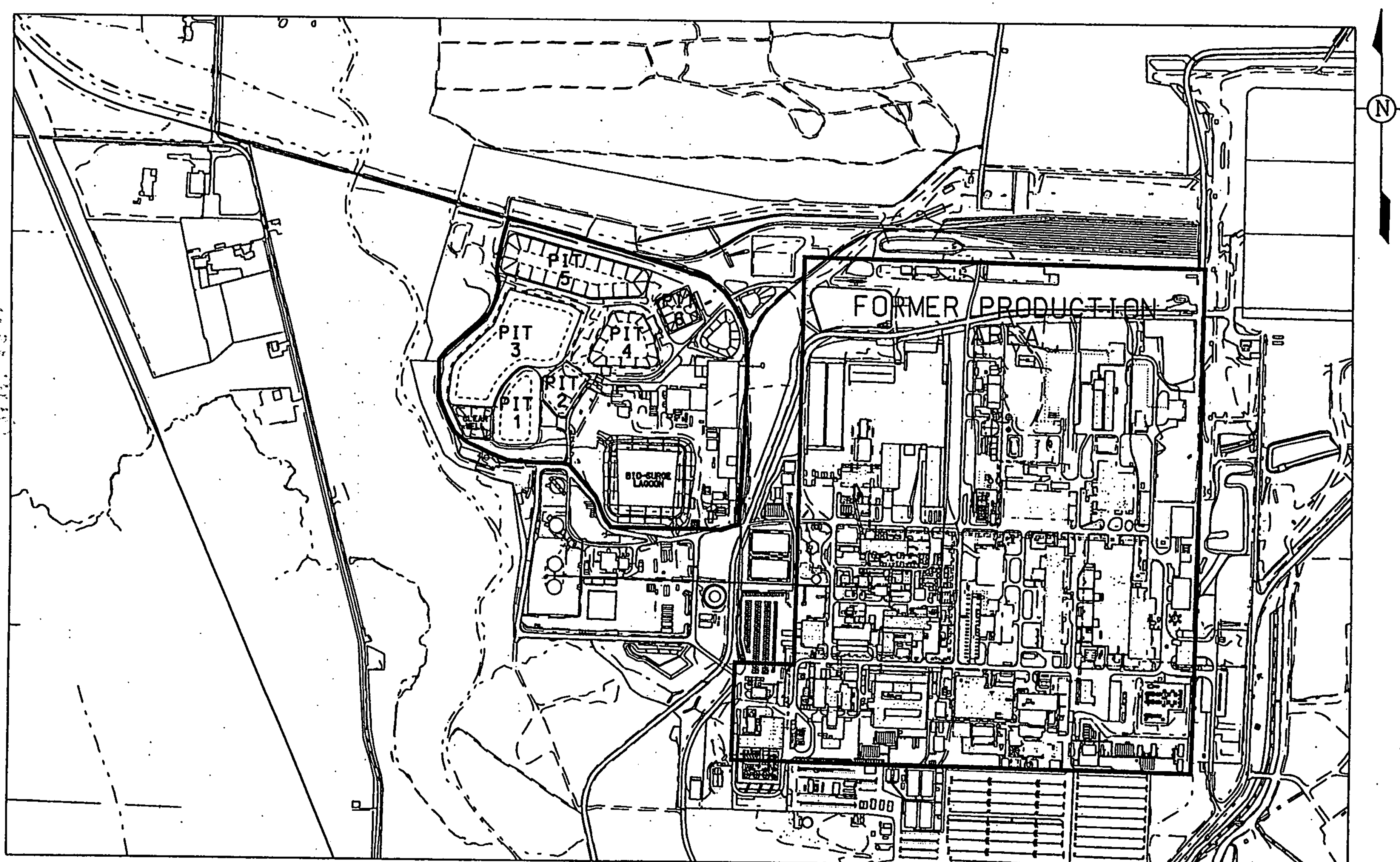
1.5 KEY PROJECT PERSONNEL

The key project personnel are listed in Table 1-1.

TABLE 1-1
KEY PERSONNEL

Title	Primary	Alternate
DOE Contact	Dave Lojek	John Hall
WPRAP Project Director	Mark Cherry	Monty Morris
WPRAP Technical Support Services Manager	Christine Messerly	Bill Westerman
Field Sampling Lead	Tom Buhrlage	Jim Hey
Characterization Lead	Bill Westerman	Frank Miller
Surveying Lead	Jim Schwing	Andy Clinton
WAO Contact	Joe Jacoboski	Bob Bischoff
Laboratory Contact	Denise Arico	Brenda Collier
Data Management Lead	Bill Westerman	Christine Messerly
Field Data Validation Contact	Andy Sandfoss	Dee Dee Early
Data Validation Contact	Jim Chambers	Andy Sandfoss
FACTS/SED Database Contact	Cara Sue Schaefer	TBD
Quality Assurance Contact	Mike Hoge	Leslie Williams
Radiological Control	Robert Holley	Russ Hall
WPRAP Pit Excavation Oversight	Marshall Linton	Grant Hale
Health and Safety Contact	Charlie Lineberry	Todd Valli

FACTS – Fernald Analytical Computerized Tracking System
SED – Sitewide Environmental Database
WAO – Waste Acceptance Organization



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STATE PLANAR COORDINATE SYSTEM 1983

FIGURE 1-1. LOCATION OF OU-1 WASTE PITS AT FEMP

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STATE PLANAR COORDINATE SYSTEM 1983

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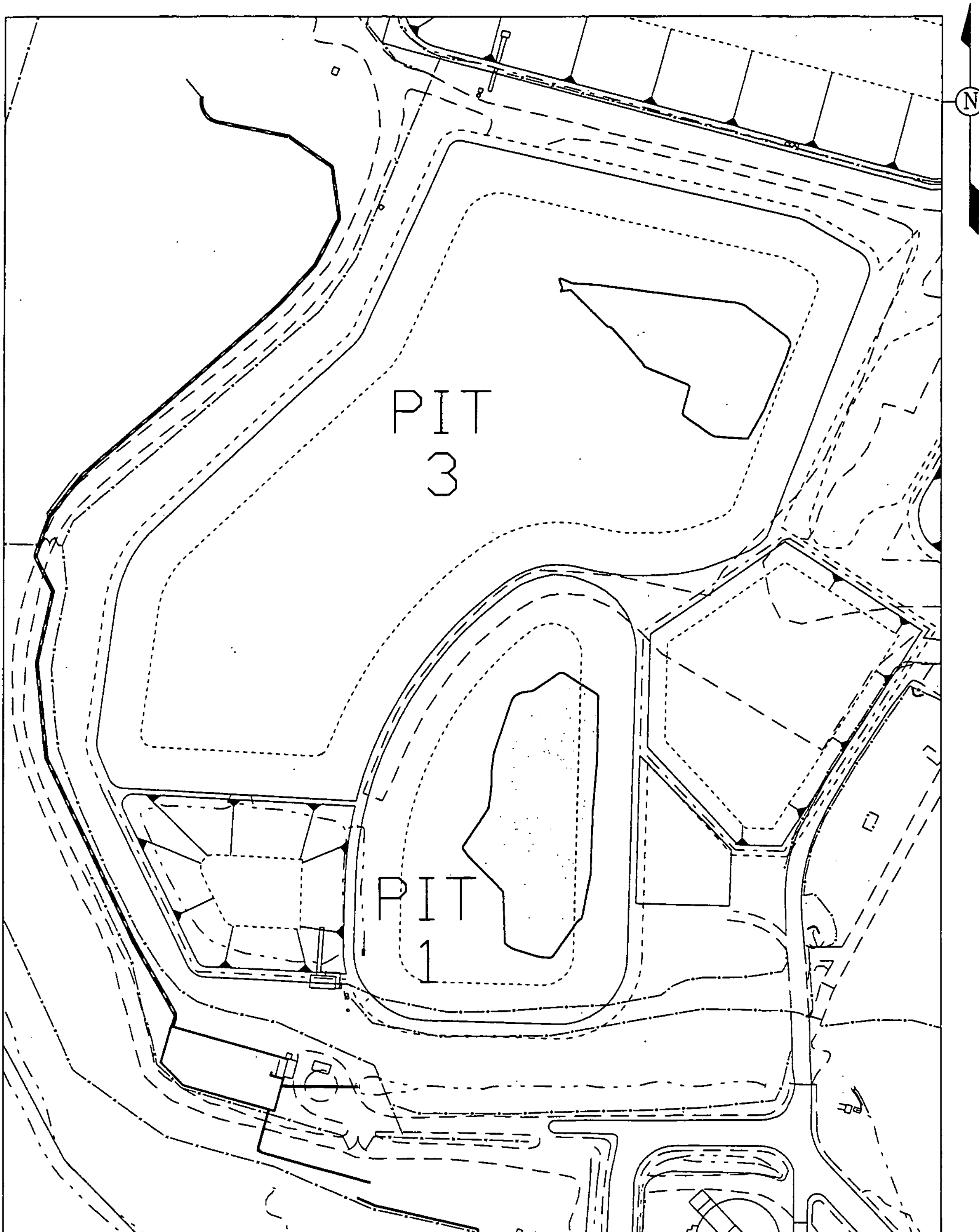

LEGEND:

EXCAVATED PIT FLOOR SURFACE

SCALE

140 70 0 140 FEET

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000010

FIGURE 1-2. EXCAVATED PORTIONS OF FLOORS OF PITS 1 AND 3

2.0 PHYSICAL SAMPLING STRATEGY

2.1 SELECTION OF SAMPLE LOCATIONS

Sample locations were chosen to meet the objectives presented in Section 1, while taking into consideration efforts to minimize cross-contamination. The proposed boring locations are presented on Figures 2-1 and 2-2. The ten proposed boring locations (Borings 23126 through 23135) are positioned within the area of waste pit floor surface (i.e., top of the pit liner) currently uncovered by excavation. Prior to sampling, boring locations will be surveyed and marked with flags at the boring coordinates listed in Table 2-1.

2.2 SAMPLE COLLECTION METHODS

Each 1-foot interval of clay liner at each boring location will be sampled for each of the Target Analyte Lists (TAL) in Appendix B, with the exception of TAL E (dioxins/furans). Samples for all but TAL E will also be collected from each 1-foot interval of the liner subsurface material, to a depth of 4 feet below the bottom of the liner material. Three samples for TAL E will be collected from each boring: one from the first 1-foot interval of liner material; another from material composited from the remaining depth of liner material; and a third sample composited from the 4 feet of subsurface material below the liner. Compositing of samples will be done as specified in Procedure SMPL-01, Solids Sampling.

For those pits with clay liners, the liner and liner subsurface materials are of distinctly different composition. These two materials will be sampled and analyzed separately and should not be included in the same sample. To avoid mixing the two, some combined material at the liner/subsurface interface may not be suitable for sample collection and should not be included as part of the sample material from that 1-foot interval. Also, if the bottom interval of the liner material is less than 1-foot but greater than 6 inches, it will be sampled as a separate interval. If the bottom interval of the liner material is 6 inches or less, this material will be included in the sample material of the previous depth interval.

Borings will be completed using the Geoprobe® dual tube sampling instrument. For borehole locations that can not be accessed by the vehicle mounted Geoprobe® hydraulic boring system, the sampling instrument will be driven and retrieved manually, unless a safe alternative mechanical means is available. All soil samples will be collected in accordance with procedure SMPL-01, Solids Sampling. If refusal or resistance is encountered during sample collection, or if boring location access is difficult or impossible, the boring location may be relocated up to 10 feet from the original location, after coordination with the WPRAP Technical Support Services manager or designee. If the boring must be relocated greater than 10 feet from the originally planned sample point, the change will be documented on a V/FCN form, as described in Section 3.4.

Because of the proximity of the Great Miami Aquifer (GMA) to the bottom of the waste pit liners, when sampling the pit liners and underlying material it is critically important to prevent cross-contamination within the borehole. Prior to collection of the sample cores, the field sampling technician will remove any pit waste material overlying the clay liner material within a 12-inch radius from the point to be sampled. No borehole will be placed within 10 feet of any liquid pooled on the waste pit floor. Sampling will not be conducted within eight hours of predicted (greater than 30 percent chance) precipitation. A containment barrier will be closely available to place around a borehole in process in the case of unexpected rain. Boreholes in the pit liner will be plugged (as specified in Section 2.6) immediately upon completion and any partially completed borehole shall not be left unplugged overnight or left unattended during the day of sampling. When plugging the boreholes, a tamping device should be used periodically to ensure no gaps due to bridging exist in the bentonite material.

At each boring location, the sampling device will be driven to the appropriate depth and, upon removal, all cores will be laid out on clean plastic. Any debris (e.g., wood, glass, metal) contained in the sample intervals will be removed and included in a visual description of all sample core material, to be recorded in the field documentation.

The entire length of each soil core will be surveyed by the sampling technician with a beta/gamma survey meter (Geiger-Mueller) and all survey results will be recorded in the field documentation. A sample will be collected from the interval with the highest reading in each boring and submitted to the on-site laboratory for alpha/beta analysis results for off-site shipping purposes. If all intervals indicate no contamination above background, the alpha/beta sample will be collected from the first 12-inch interval collected.

Following beta/gamma screening, the appropriate sample intervals, as specified in Section 2.1, will be collected. Sample volume and analysis information are summarized in Table 2-2. Following appropriate sample container screening and documentation by the project radiological technician, all samples will be delivered to the on-site Sample Processing Laboratory, where the samples for SVOC/PAH, pesticide/PCB, herbicides, and dioxins and furans analysis will be prepared for shipment to an approved off-site laboratory, in accordance with Procedure 9501, Shipping Samples to Off-Site Laboratories. The samples for VOC analysis can be analyzed either on site or off site and direction on where to send the samples will be provided by the Analytical Project Manager. Trip blank water samples will be required to accompany the soil samples for VOC analysis. Radiological, inorganic, and alpha/beta screening analyses will be done on site. All samples will be analyzed for the appropriate TALs, as identified in Appendix B.

2.3 SAMPLE IDENTIFICATION

All physical samples collected for laboratory analysis will be assigned a unique sample identifier. This identifier will consist of the boring location designation, followed by a depth interval identification (1 = 0 to 1 feet below the liner surface, 2 = 1 to 2 feet below the liner surface, etc.), followed by designation of the sample material type ("CL" for clay liner material, and "SS" for liner subsurface material), followed by a letter designating the category of analysis of the sample ("L" for VOCs, "S" for SVOC/PAH, "R" for radiological, "M" for inorganics, "P" for pesticide/PCB, "H" for herbicide, "F" for dioxins and furans, "TB" for trip blank, and "AB" for alpha/beta screening). Because some samples collected for dioxin/furan analysis will be composited from multiple intervals, the composited interval will be recorded as the upper depth interval, followed by a forward slash, followed by the deeper interval (e.g., a sample composited from the 2 to 3-foot interval through the 7 to 8-foot interval would indicate a depth interval of "3/8"). For example, 23126-2/5-CL-F is a sample collected from boring location 23126, consisting of composited material from the 1 to 2-foot interval through the 4 to 5-foot interval below the liner surface, containing clay liner material, for dioxin/furan analysis. Sample identifier 23133-3-SS-L is a sample collected from boring location 23133, within the 2 to 3-foot interval below the liner surface, containing liner subsurface material, for VOC analysis.

If a boring location requires multiple borings due to subsurface refusal or the need for additional sample material to meet the required volumes for analysis, the boring identifier for subsequent borings will be designated with an alphabetic suffix (e.g., 23126A, 23126B, etc.). Therefore, a SVOC sample collected from subsurface material within the 4 to 5-foot interval below the liner surface of the third boring at location 23133 would be 23133B-5-SS-S. The movement of any boring point more than 6 inches away from the scheduled boring location will be recorded in field documentation for later correction of the field coordinates of the boring point.

2.4 EQUIPMENT DECONTAMINATION

Decontamination is performed on the sampling equipment to protect worker health and safety and to prevent the introduction of contaminants into subsequent soil samples. Equipment that comes into contact with sample material (i.e., cutting shoes, etc.) will be decontaminated at Level II (Section K.11, SCQ) prior to transport to the field site, between sample locations, and after sampling performed under this PSP is completed. Other equipment that does not contact sample media may be decontaminated at Level I, or wiped down using disposable towels. Clean disposable wipes may be used to replace air drying of the equipment.

Based on the isotope of concern (Th-230) and due to the nature and extent of work to be performed within the waste pit areas it may be necessary to incorporate additional radiological controls on equipment or supplies to prevent or mitigate the potential spread of radiological contamination. Thus, in an effort to reduce the decontamination effort prior to release from radiological areas, members of the sampling team may be required to use plastic, herculite or other non-permeable materials on items that come or are likely to come into direct contact with sample material.

2.5 SAMPLING WASTE DISPOSITION

Excess soil from the borings will be disposed of in the waste pit from which it was collected. Any water (used decontamination water, flushed groundwater, etc.) generated during sampling will be disposed at the wastewater discharge sump located in each waste pit.

2.6 BOREHOLE ABANDONMENT

Each borehole will be plugged using bentonite pellets or a bentonite grout slurry immediately after sampling is completed. If pellets are used, they will be placed in the borehole in 2-foot intervals, then hydrated with potable water. The field sampling lead will direct the field team on which abandonment option will be used. A Borehole Abandonment Log will be completed for each borehole.

TABLE 2-1
BORING IDENTIFICATION NUMBERS AND COORDINATES

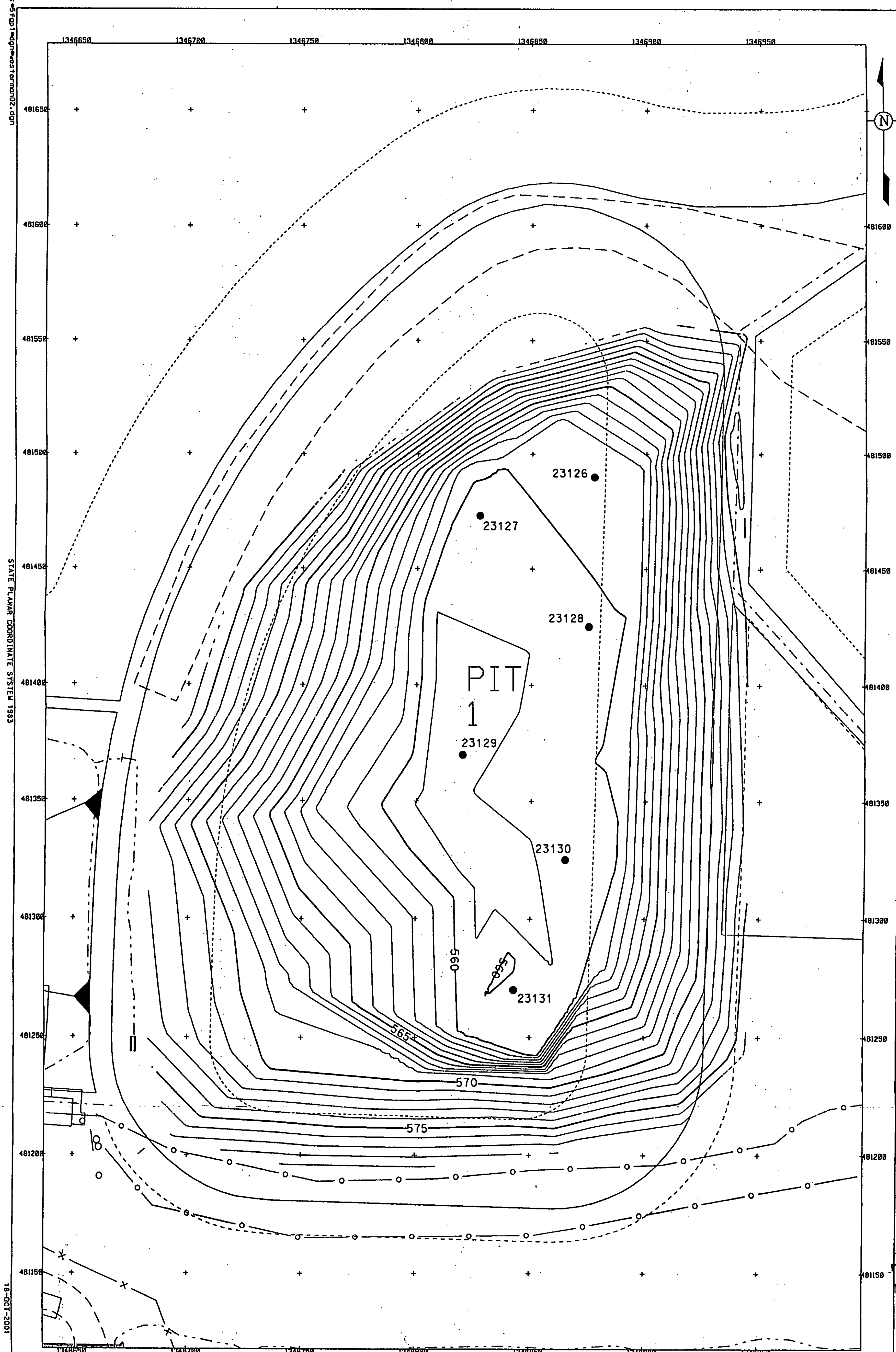
Boring Id	Northing	Easting
PIT 1		
23126	481490	1346877
23127	481473	1346827
23128	481425	1346875
23129	481370	1346820
23130	481325	1346865
23131	481270	1346843
PIT 3		
23132	481860	1346930
23133	481840	1346990
23134	481820	1347042
23135	481772	1347030

TABLE 2-2
SAMPLING AND ANALYTICAL REQUIREMENTS

Analyte	Required Detection Limit	Sample Matrix	Lab	ASL	Preservation	Holding Time	Container	Sample Mass
VOC (TAL A)	Per Method	Solid	On-site or off-site	B	Cool 2°-6°C	14 days	glass w/ Teflon cap	30 grams, fill to no headspace
VOC (TAL A)	Per Method	Water (trip blanks)	On-site or off-site	B	Cool 2°-6°C H_2SO_4,pH<2	14 days	3 x 40ml glass w/septa	fill to no headspace
SVOC/PAH (TAL B)	Per Method	Solid	Off-site	B	Cool 2°-6°C	14 days	glass w/ Teflon cap	100 grams[a]
Pesticide/PCB (TAL C)	Per Method	Solid	Off-site	B	Cool 2°-6°C	14 days	glass w/ Teflon cap	100 grams[a]
Herbicides (TAL D)	Per Method	Solid	Off-site	B	Cool 2°-6°C	14 days	glass w/ Teflon cap	100 grams[a]
Dioxin/Furan (TAL E)	Per Method	Solid	Off-site	B	Cool 2°-6°C	14 days	glass w/ Teflon cap	30 grams[a]
Radionuclides (TAL F)	Per Method	Solid	On-site	B	none	one year	glass	250 grams
Inorganics (TAL G)	Per Method	Solid	On-site	B	Cool 2°-6°C	28 days[b]	glass w/ Teflon cap	30 grams
Alpha/Beta Screen	N/A	Solid	On-site	B	none	N/A	any	10 grams

ASL – Analytical Support Level

[a] One sample from each off-site sample shipment (which will be chosen by the field sampling lead) must have at least three times the mass specified, for laboratory QC.
[b] Mercury hold time is 28 days; rest are six months.



LEGEND:

● PROPOSED BORING LOCATION

SCALE

40 20 0 40 FEET

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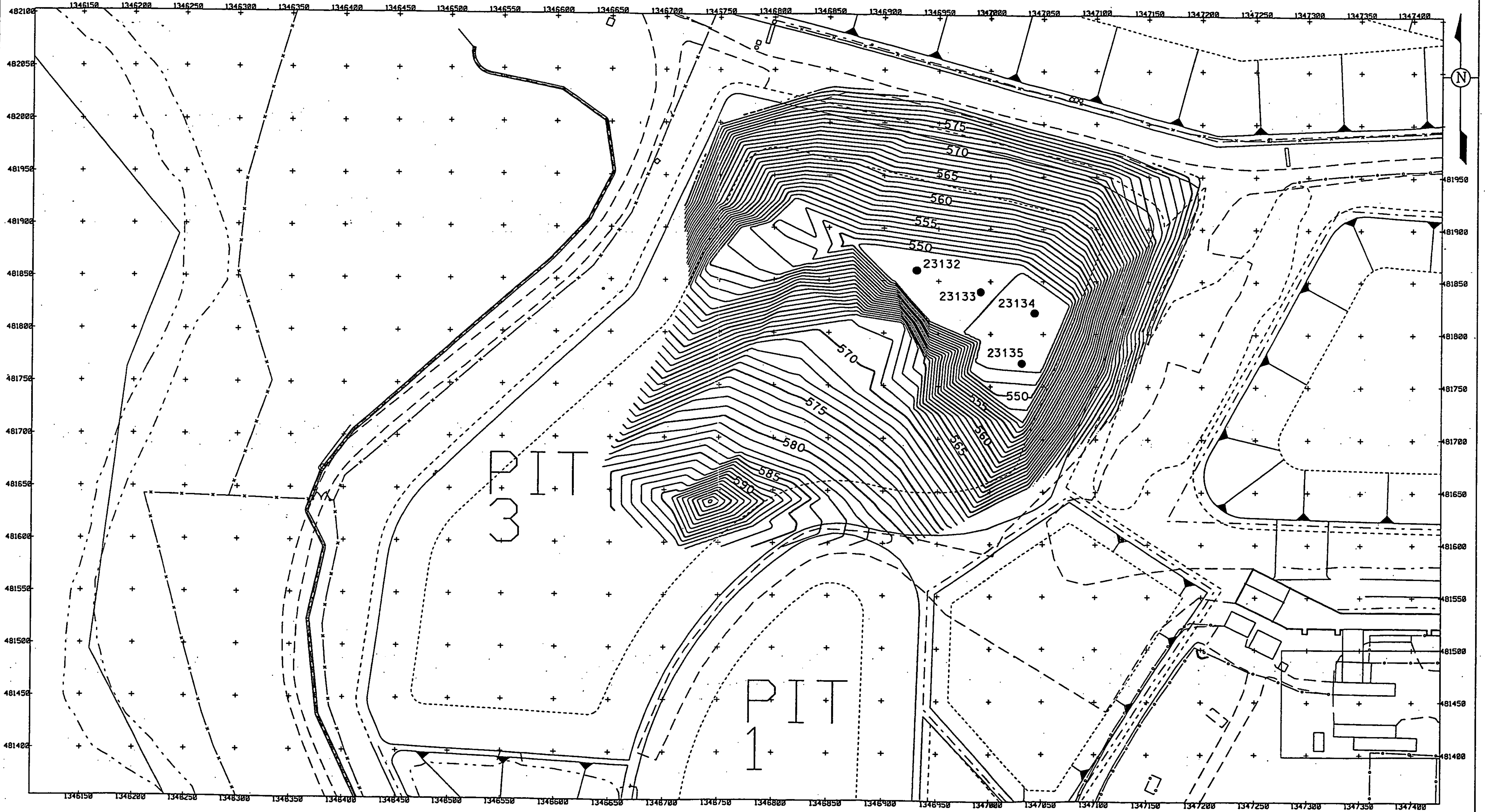
FIGURE 2-1. PROPOSED PIT 1 BORING LOCATIONS



LEGEND:

● PROPOSED BORING LOCATION

SCALE

90 45 0 90 FEET

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STATE PLANAR COORDINATE SYSTEM 1983

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FIGURE 2-2. PROPOSED PIT 3 BORING LOCATIONS

3.0 QUALITY ASSURANCE/QUALITY CONTROL REQUIREMENTS

3.1 FIELD QUALITY CONTROL SAMPLES, ANALYTICAL REQUIREMENTS AND DATA VALIDATION

In accordance with the requirements of DQO SL-061, Revision 1 (see Appendix B), the field quality control, analytical, and data validation requirements are as follows:

- All laboratory analyses will be performed at ASL B (ASLs are defined in the SCQ).
- Trip blank field QC samples will be required. A sample selected for lab matrix spike and matrix spike duplicate (requires additional soil; see Table 2-2) will be designated by the Sampling Lead on the Chain of Custody form for each shipment of samples sent for off-site analysis.
- All field data will be validated. Ten percent of the analytical data will be validated to ASL B and require a certificate of analysis and associated laboratory quality assurance/quality control results.

3.2 PROJECT-SPECIFIC PROCEDURES, MANUALS AND DOCUMENTS

To assure consistency and data integrity, field activities in support of this PSP will follow the requirements and responsibilities outlined in controlled procedures and manufacturer operational manuals. Applicable procedures, manuals, and documents include:

- SMPL-01, Solids Sampling
- SMPL-02, Liquids and Sludge Sampling
- SMPL-21, Collection of Field Quality Control Samples
- EQT-04, Photoionization Detector
- EQT-05, Geodimeter® 4000 Survey System B Operation, Maintenance, and Calibration
- EQT-06, Geoprobe® Model 5400 Operation and Maintenance Manual
- EW-0002, Chain of Custody/Request for Analysis Record for Sample Control
- 5507, Drying and Grinding Solid Samples in Preparation for Laboratory Analysis
- 9503, Processing Samples through the Sample Processing Laboratory
- 9505, Using the FACTS Database to Process Samples
- 7532, Analytical Laboratory Services Internal Chain of Custody
- 9501, Shipping Samples to Off-Site Laboratories
- RM-0020, Radiological Control Requirements Manual
- 10500-H1, IT Health and Safety Program
- 10500-017, IT WPRAP Excavation Plan
- Sitewide CERCLA Quality Assurance Project Plan (SCQ)
- Sitewide Excavation Plan (SEP)

3.3 PROJECT REQUIREMENTS FOR INDEPENDENT ASSESSMENTS

Project management has ultimate responsibility for the quality of the work processes and the results of the sampling activities covered by this PSP. The QA organization may conduct independent assessments of the work processes and operations to assure the quality of performance. Assessments will encompass technical and procedural requirements of this PSP and the SCQ.

3.4 IMPLEMENTATION OF FIELD CHANGES

If field conditions require changes or variances, the project manager must prepare a V/FCN. The completed V/FCN must contain the signatures of all affected organizations, which at a minimum includes the Project Manager, Technical Support Services Manager, and Quality Assurance (QA) but may also include Field Sampling, or Sample Management Office, as appropriate. A time-critical variance may be obtained in cases where expedited approval is needed to avoid costly project delays. In the case of a time-critical variance, verbal or written approval (electronic mail is acceptable) must be received from the Technical Support Services Manager and from QA prior to implementing the variance. The completed approved V/FCN form must be completed within five working days after the time-critical variance is approved.

4.0 HEALTH AND SAFETY

The Fluor Fernald and International Technology (IT) Excavation Managers, IT Health and Safety Lead, Field Sampling Leads, and team members will assess the safety of performing sampling activities in the Waste Storage Area. This will include vehicle/equipment positioning limitations and fall hazards.

Sample technicians will conform to precautionary surveys performed by Radiological Control, Safety, and Industrial Hygiene personnel. All work on this project will be performed in accordance with applicable Environmental Monitoring procedures, RM-0020 (Radiological Control Requirements Manual), IT Health and Safety Plan, Fluor Fernald work permit, Radiological Work Permit (RWP), penetration permit and other applicable permits. Concurrence with applicable safety permits (as indicated by the signature of each field team member assigned to this project) is required by each team member in the performance of their assigned duties.

Sampling technicians will also comply with any specific requirements for activity conducted within the waste pits area, including the Excavation Plan, the non-typical waste procedure, access restrictions, respiratory requirements, and health and safety briefings that may be required by IT procedures. Any access to the waste pits area must be authorized by a competent (i.e., certified in excavation activity) excavation manager. Members of the sampling team are also required to be on the beryllium monitoring list. Because waste pit excavation activities using heavy equipment may be ongoing during this sampling activity, the sampling team and support personnel must pay special attention to such activities and maintain a safe distance from the heavy equipment work zones as well as ensuring that the heavy equipment operators are aware of their presence.

The Field Sampling Lead will ensure that each technician performing work related to this project has been trained to the relevant sampling procedures including safety precautions. Technicians who do not sign project safety and technical briefing forms will not participate in any activities related to the completion of assigned project responsibilities. A copy of applicable safety permits/surveys issued for worker safety and health will be posted in the affected area during field activities.

A daily safety briefing will be conducted prior to the initiation of field activities. All emergencies will be reported immediately to the IT control room, the site communication center at 648-6511 by cell phone, 911 on-site phone, or by contacting "control" on the radio.

5.0 DATA MANAGEMENT

A data management process will be implemented so information collected during the investigation will be properly managed to satisfy data end use requirements after completion of the field activities. As specified in Section 5.1 of the SCQ, sampling teams will describe daily activities on a Field Activity Log, which should be sufficient for accurate reconstruction of the events at a later date without reliance on memory. Sample Collection Logs will be completed according to protocol specified in Section 6 of the SCQ and in applicable procedures. These forms will be maintained in loose-leaf form and uniquely numbered following the field sampling event. At least weekly, a copy of all field logs will be sent to the Data Management Lead.

All field measurements, observations, and sample collection information associated with physical sample collection will be recorded, as applicable, on the Sample Collection Log, the Field Activity Log, and the Chain of Custody/Request for Analysis Form, as required. The method of sample collection will be specified in the Field Activity Log. Borehole Abandonment Logs are required. The PSP number will be on all documentation associated with these sampling activities.

Samples will be assigned a unique sample number as explained in Section 2.3. This unique sample identifier will appear on the Sample Collection Log and Chain of Custody/Request for Analysis and will be used to identify the samples during analysis, data entry, and data management.

Technicians will review all field data for completeness and accuracy and then forward the data package to the Field Data Validation Contact for final review. The field data package will be filed in the records of the Environmental Management Project. Analytical data that is designated for data validation will be forwarded to the Data Validation Group. The PSP requirements for analytical data validation are outlined in Section 3.1. Analytical data from the on- and off-site laboratories will be reviewed by the Data Management Lead prior to transfer of the data to the SED from the FACTS database.

Following field and analytical data validation, the Sample Data Management organization will perform data entry into the SED.

APPENDIX A

DATA QUALITY OBJECTIVE SL-061, REV. 1

Control Number ___________

Fernald Environmental Management Project

Data Quality Objectives

Title: Characterization of Waste Pit Liners and Underlying Materials

Number: SL-061

Revision: 1

Effective Date: November 27, 2001

Contact Name: William Westerman

Approval: ______________________ Date: 11/27/01
James Chambers
DQO Coordinator

Approval: ______________________ Date: 11-27-01
Mark Cherry
Project Manager

Rev. #	0	1						
Effective Date:	11/01/01	11/27/01						

DATA QUALITY OBJECTIVES
Sitewide Certification Sampling and Analysis

Members of Data Quality Objectives (DQO) Scoping Team

The members of the scoping team included individuals with expertise in QA, analytical methods, field sampling, statistics, laboratory analytical methods and data management.

Conceptual Model of the Site

Media is considered contaminated if the concentration of a constituent of concern (COC) exceeds the final remediation levels (FRLs). The contents of the waste pits were characterized as part of the RI/FS effort, but care was taken not to breach the waste pit liners to prevent leaching of waste pit material into the underlying soil. Therefore, the liners and underlying soils have never been sampled, and need to be characterized. This DQO covers all physical sampling activities associated with the characterization of the waste pit liners and underlying soils to determine if radiological and chemical contamination have penetrated the liner material and subsurface material of the waste pits, measure the level of contaminants in the liner material and liner subsurface material at various depths below the pit floor surface, and determine the thickness and composition of pit liner material as well as the lithology of the material underlying the liners. Specific sampling activity conducted in pursuance of this DQO will be identified and described in Project Specific Plan (PSP) documentation.

Final Remediation Levels (FRLs) for constituents of concern (COCs), were identified in the OU5 Record of Decision (ROD). Media is considered contaminated if the concentration of a COC exceeds the FRL. Actual soil remediation activities now fall under the guidance of the final Sitewide Excavation Plan (SEP).

1.0 **Statement of Problem**

The extent (depth and/or area) of potential COC contamination in the waste pit liners and underlying soils is unknown, and it must be defined with respect to the appropriate target level (FRL, WAC, or other specified media concentration).

2.0 **Identify the Decision**

Delineate the vertical and/or horizontal extent of contamination of the waste pit liner material as well as that of soils underlying the waste pits.

3.0 **Inputs That Affect the Decision**

Informational Inputs - Historical data, process history knowledge, the modeled extent of COC contamination, and the origins of contamination will be required to establish a sampling plan to delineate the extent of COC contamination. The desired precision of the delineation must be weighed against the cost of collecting and analyzing additional samples in order to determine the optimal sampling density. The project-specific plan will identify the optimal sampling density.

Contaminant-Specific Action Levels

The cleanup levels are the soil FRLs published in the OU5 ROD.

Methods of Sampling and Analysis

Physical soil samples will be collected in accordance with the applicable site sampling procedures identified in the PSP. Laboratory analysis will be conducted at ASL B using QA/QC protocols specified in the SCQ. Full raw data deliverables will be required from the laboratory to allow for appropriate data validation. For FEMP-approved on- and off-site laboratories, the analytical method used will meet the required precision, accuracy and detection capabilities necessary to achieve appropriate COC action level ranges.

4.0 **The Boundaries of the Situation**

Temporal Boundaries - Sampling must be completed within a time frame sufficient to meet the remediation schedule. Time frames must allow for the scheduling of sampling and analytical activities, the collection of samples, analysis of samples and the processing of analytical data when received.

Spatial Boundaries - The boundaries of this DQO extend to the areas of each waste pit (including the Burn Pit and Clearwell).

Scale of Decision Making - The decision made based upon the data collected in this investigation will be the extent of COC contamination at or above the appropriate action level. This delineation will result in media contaminant concentration information being incorporated into engineering design, and the attainment of established remediation goals.

Parameters of Interest - The COCs include VOC, SVOC/PAH, Inorganic, Pesticide/PCB, Herbicide, and radiological constituents. Because the material to be sampled in this PSP has never been sampled, the list of analytical COCs will be expanded from the specific constituents listed in the SEP to include the entire standard list of constituents within each of these analytical categories. As sampling and analysis continues over the course of waste pit excavation, the list of analytical constituents may be modified.

5.0 Decision Rule

If existing data provide an unacceptable level of uncertainty in the COC delineation model, then additional sampling will take place to decrease the model uncertainty. When deciding what additional data is needed, the costs of additional sampling and analysis must be weighed against the benefit of reduced uncertainty in the delineation model, which will eventually be used for assigning excavation, or for other purposes.

6.0 Limits on Decision Errors

In order to be useful, data must be collected with sufficient areal and depth coverage, and at sufficient density to ensure an accurate delineation of COC concentrations. Analytical sensitivity and reproducibility must be sufficient to differentiate the COC concentrations below their respective target levels.

Types of Decision Errors and Consequences

Decision Error 1 - This decision error occurs when the decision-maker determines that the extent of media contaminated with COCs above action levels is not as extensive as it actually is. This error can result in a remediation design that fails to incorporate media contaminated with COC(s) above the action level(s). This could result in the re-mobilization of excavation equipment and delays in the remediation schedule. Also, this could result in media contaminated above action levels remaining after remediation is considered complete, posing a potential threat to human health and the environment.

Decision Error 2 - This decision error occurs when the decision maker determines that the extent of media contaminated above COC action levels is more extensive than it actually is. This error could result in more excavation than necessary, thus incurring unnecessary remediation time and disposal costs.

True State of Nature for the Decision Errors - The true state of nature for Decision Error 1 is that the maximum extent of contamination above action levels is more extensive than was determined. The true state of nature for Decision Error 2 is that the maximum extent of contamination above action levels is not as extensive as was determined. Decision Error 1 is the more severe error.

7.0 Optimizing Design for Useable Data

7.1 Sample Collection

Existing data, process knowledge, and the origins of contamination were used to determine the COCs and lateral and vertical extent of sample collection. The PSP will identify the locations and depths to be sampled, the sampling density necessary to obtain the desired accuracy of the delineation, and if samples will be analyzed by the on-site or off-site laboratory. The PSP will also identify the sampling increments to be selectively analyzed for concentrations of the COC(s) of interest, along with field work requirements. Analytical requirements will be listed in the PSP. The chosen analytical methodologies are able to achieve a detection limit capable of resolving the COC action level.

7.2 COC Delineation

The media COC delineation will use all field and analytical data collected under the PSP. The delineation may be accomplished through modeling (e.g. kriging) of the COC concentration data with a confidence limit specific to project needs that will reduce the potential for Decision Error 1. A very conservative approach to delineation may also be utilized where the boundaries of the contaminated media are extended to the first known vertical and horizontal sample locations that reveal concentrations below the desired action level.

7.3 QC Considerations

Field QC Samples
Field QC samples will be defined in the individual PSP(s).

Laboratory Analysis
As defined in the PSP, samples will be submitted to the on-site laboratory or a FDF approved off-site laboratory for analysis. All analyses will meet ASL B requirements per the SCQ.

Validation
All field data will be validated. Also, a minimum of 10 percent of the analytical data from each laboratory will be subject to analytical validation to ASL B requirements in the SCQ, and will require a minimum of an ASL B package.

Data Quality Objectives
Sitewide Certification Sampling and Analysis

1.A. Task/Description: Certification Sampling and Analysis

1.B. Project Phase: (Circle the appropriate selection.)

RI FS $\boxed{\text{RD}}$ RA RvA Other (specify)

1.C. DQO No.:__________ DQO Reference No.:__________

2. Media Characterization: (Circle the appropriate selection(s).)

Air	Groundwater	$\boxed{\text{Soil}}$	Waste	Other (specify)
Biological	Sediment	Surface Water	Waste Water	

3. Data Use with Analytical Support Level (A-E): (Circle the appropriate Analytical Support Level selection(s) for each applicable Data Use.)

Site Characterization
A $\boxed{\text{B}}$ C D E

Risk Assessment
A B C D E

Evaluation of Alternatives
A B C D E

Engineering Design
A B C D E

Monitoring during remediation activities
A B C D E

Other (Certification)
A B C D E

4.A. **Drivers:** Sitewide Excavation Plan, Remedial Action Work Plans, Applicable or Relevant and Appropriate Requirements (ARARs) and the OU5 Record of Decision (ROD).

4.B. **Objective:** Delineate the extent of media contaminated with a COC (or COCs) with respect to the action level(s) of interest.

5. **Site Information (Description):** The waste pit liners and underlying soils, which have never been sampled.

6.A. Data Types with appropriate Analytical Support Level Equipment Selection and SCQ Reference: (Circle the appropriate box or boxes selecting the type of analysis or analyses required. Then select the type of equipment to perform the analysis if appropriate. Please include a reference to the SCQ Section.)

1. pH Temperature Specific Cond. Diss. Oxygen Technetium-99	2. Uranium Full Radiological Metals Cyanide Silica	3. BTX TPH Oil/Grease
4. Cations Anions TOC TCLP CEC COD	5. VOA BNA Pesticides PCBs Herbicides	6. Other (Specify) dioxins & furans

6.B. Equipment Selection and SCQ Reference:

	Equipment Selection		SCQ Reference
ASL A		SCQ Section:	
ASL B	Per SCQ and PSP	SCQ Section:	App. G1&G2; App. K
ASL C		SCQ Section:	
ASL D		SCQ Section:	
ASL E		SCQ Section:	

7.A. Sampling Methods: (Circle the appropriate selection(s).)

Biased	Composite	Environmental	Grab	Grid
Intrusive	Nonintrusive	Random	Phased	Source

7.B. Sample Work Plan Reference: Project Specific Plan for the associated Remediation area Remedial Action Work Plan

Background samples: None

7.C. Sample Collection Reference:

Sample Collection Reference: Associated PSP, SMPL-01

8. Quality Control Samples: (Circle the appropriate selection.)

8.A. Field Quality Control Samples:

Trip Blanks (VOCs Only) **	Container Blanks
Field Blanks **	Duplicate Samples **
Equipment Rinsate Samples **	Split Samples
Preservative Blanks	Performance Evaluation Samples
Other (specify)	

**As noted in the PSP

8.B. Laboratory Quality Control Samples:

Method Blank	Matrix Duplicate/Replicate
Matrix Spike	Surrogate Spikes
Tracer Spike	
Other (specify)	

9. Other: Please provide any other germane information that may impact the data quality or gathering of this particular objective, task or data use.

APPENDIX B

TARGET ANALYTE LISTS

APPENDIX B
TARGET ANALYTE LISTS

TAL 10000-PSP-0003-A

Soil and Water VOC Analysis, On-site or Off-site, ASL B	
1	Chloromethane
2	Bromomethane
3	Vinyl Chloride
4	Chloroethane
5	Methylene Chloride
6	Acetone
7	Carbon Disulfide
8	1,1-Dichloroethene
9	1,1-Dichloroethane
10	Cis-1,2-Dichlorothene
11	Trans-1,2-Dichloroethene
12	Chloroform
13	1,2-Dichloroethane
14	2-Butanone
15	1,1,1-Trichloroethane
16	Carbon Tetrachloride
17	Bromodichloromethane
18	1,2-Dichloropropane
19	Cis-1,3-Dichloropropene
20	Trichloroethene
21	Dibromochloromethane
22	1,1,2-Trichloroethene
23	Benzene
24	Trans-1,3-Dichloropropene
25	Bromoform
26	4-Methyl-2-pentanone
27	2-Hexanone
28	Tetrachloroethene
29	1,1,2,2-Tetrachloroethane
30	Toluene
31	Chlorobenzene
32	Ethylbenzene
33	Styrene
34	Xylenes (total)

TAL 10000-PSP-0003-B

Soil SVOC Analysis, Off-site, ASL B			
1	Phenol	34	2,4-Dinitrophenol
2	bis(2-Chloroethyl)ether	35	4-Nitrophenol
3	2-Chlorophenol	36	Dibenzofuran
4	1,3-Dichlorobenzene	37	2,4-Dinitrotoluene
5	1,4-Dichlorobenzene	38	Diethylphthalate
6	1,2-Dichlorobenzene	39	4-Chlorophenyl-phenylether
7	2-Methylphenol	40	Fluorene
8	2,2'-oxybis(1-Chloropropane)	41	4-Nitroaniline
9	4-Methylphenol	42	4,6-Dinotro-2-methylphenol
10	N-Nitroso-di-n-propylamine	43	N-Nitrosodiphenylamine
11	Hexachloroethane	44	4-Bromophenyl-phenylether
12	Nitrobenzene	45	Hexachlorobenzene
13	Isophorone	46	Pentachlorophenol
14	2-Nitrophenol	47	Phenanthrene
15	2,4-Dimethylphenol	48	Anthracene
16	bis(2-Chloroethoxy)methane	49	Carbazole
17	2,4-Dichlorophenol	50	Di-n-butylphthalate
18	1,2,4-Trichlorobenzene	51	Fluoranthene
19	Naphthalene	52	Pyrene
20	4-Chloroaniline	53	Butylbenzylphthalate
21	Hexachlorobutadiene	54	3,3'-Dichlorobenzidine
22	4-Chloro-3-methylphenol	55	Benzo(a)anthracene
23	2-Methylnaphthalene	56	bis(2-Ethylhexyl)phthalate
24	Hexachlorocyclopentadiene	57	Chrysene
25	2,4,6-Trichlorophenol	58	Di-n-octylphthalate
26	2,4,5-Trichlorophenol	59	Benzo(b)fluoranthene
27	2-Chloroaphthalene	60	Benzo(k)fluoranthene
28	2-Nitroaniline	61	Benzo(a)pyrene
29	Dimethylphthalate	62	Indeno(1,2,3-cd)pyrene
30	Acenaphthylene	63	Dibenzo(a,h)anthracene
31	3-Nitroaniline	64	Benzo(g,h.i)perylene
32	2,6-Dinitrotoluene	65	bis(2-chloroisopropyl)ether
33	Acenaphthene		

TAL 10000-PSP-0003-C

Soil Pesticide/PCB Analysis, Off-site, ASL B	
1	α-BHC
2	β-BHC
3	δ-BHC
4	γ-BHC (Lindane)
5	Heptachlor
6	Aldrin
7	Heptachlor epoxide
8	Endosulfan I
9	Dieldrin
10	4,4'-DDE
11	Endrin
12	Endosulfan II
13	4,4'-DDD
14	Endosulfan sulfate
15	4,4'-DDT
16	Methoxychlor
17	Endrin ketone
18	Endrin aldehyde
19	α-Chlordane
20	γ-Chlordane
21	Toxaphene
22	Aroclor-1016
23	Aroclor-1221
24	Aroclor-1232
25	Aroclor-1242
26	Aroclor-1248
27	Aroclor-1254
28	Aroclor-1260

TAL 10000-PSP-0003-D

Soil Herbicide Analysis, Off-site, ASL B	
1	2,4-D
2	Dinoseb
3	2,4,5-TP(Silvex)
4	2,4,5-T

TAL 10000-PSP-0003-E

Soil Dioxins and Furans Analysis, Off-site, ASL B	
1	Tetrachlorodibenzo-p-dioxins (2,3,7,8, -TCDD)
2	Pentachlorodibenzo-p-dioxins
3	Hexachlorodibenzo-p-dioxins
4	Tetrachlorodibenzofurans
5	Pentachlorodibenzofurans
6	Hexachlorodibenzofurans

TAL 10000-PSP-0003-F

Soil Radionuclide Analysis, On-site, ASL B	
1	Total Uranium, calculated from isotopic U
2	Isotopic Uranium (U-234, -235/6, and -238)
3	Radium-228
4	Radium-226
5	Thorium-228
6	Thorium-230
7	Thorium-232
8	Technetium-99
9	Cesium-137
10	Neptunium-237
11	Plutonium-238
12	Plutonium-239/240
13	Americium-241
14	Ruthenium-106

TAL 10000-PSP-0003-G

Soil Inorganics Analysis, On-site, ASL B	
1	Aluminum
2	Antimony
3	Arsenic
4	Barium
5	Beryllium
6	Boron
7	Cadmium
8	Calcium
9	Chromium
10	Cobalt
11	Copper
12	Iron
13	Lead
14	Magnesium
15	Manganese
16	Mercury
17	Nickel
18	Potassium
19	Selenium
20	Silver
21	Sodium
22	Thallium
23	Vanadium
24	Zinc